

Brooklyn College
Department of Computer & Information Sciences

CISC 7200 [714X] Analysis of Algorithms

37½ hours plus conference and independent work; 3 credits

Introduction to algorithms and their complexity, including models of computation. Review of data structures and techniques of efficient program design. Analysis of algorithms chosen from sorting and searching, graph theory, pattern matching, matrix operations, and combinatorial optimization. Algorithms will be analyzed for their space, time, and other resource requirements. NP-complete problems. Complexity classes.

Textbook

Baase, Sara and Van Gelder. *Computer Algorithms: Introduction to Design and Analysis*, 3rd ed., Addison-Wesley.

Syllabus

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| Chapter 1: | Analyzing Algorithms
Sections 1.4, 1.5, 1.6
(Read section 1.3 – review of mathematical background) |
| Chapter 4: | Sorting
Mergesort, quicksort, heapsort
Sections 4.1 - 4.9 |
| Chapter 3: | Recurrence Equations and Recursion Trees
Iteration Method, Master Theorem
Sections 3.6, 3.7 |
| Chapter 5: | Selection
Sections 5.1 - 5.5 |
| Chapter 7: | Graphs, Representations (adjacency matrix, adjacency lists)
Graph Traversals (Depth-first, Breadth-First)
Sections 7.1-7.4 |
| Chapter 8: | Minimum Spanning Trees
Greedy Algorithms (PRIM, Kruskal)
Shortest Path (Dijkstra)
Section 8.1-8.4 |
| Chapter 11: | String Matching
Finite Automata, Knuth-Morris-Pratt algorithm
Edit Distance and Dynamic Programming |

Sections 11.1-11.5

Chapter 13: NP-Completeness
Sections 13.1-13.4, 13.8

Bibliography

Aho, Hopcroft and Ullman, *The Design and Analysis of Computer Algorithms*, Addison-Wesley.

Cormen, Leiserson and Rivest, *Introduction to Algorithms, 2nd edition*, McGraw-Hill.

Horowitz and Sahni, *Fundamentals of Computer Algorithms*, Computer Science Press.

Manber, *Introduction to Algorithms: A Creative Approach*, Addison-Wesley.